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Stem Cell Mobilization, Collection, and Processing

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Dear Editor,

Mobilizing hematopoietic stem and progenitor cells from the bone marrow into the peripheral blood, collecting them sufficiently by leukapheresis, and transplanting them in an allogeneic or autologous setting as "stem cell graft" is a routine procedure in collection facilities such as in many blood transfusion establishments and transplant centers worldwide. Patients with multiple myeloma and malignant lymphoma are the main candidates for an autologous stem cell transplantation. Today's induction regimen in both entities have been improved significantly over the last two decades, but the application of high-dose chemotherapy followed by autologous stem cell rescue still represents an essential part of the therapeutic regimen. In this context, the collection of an optimal stem cell product is an important prerequisite.

This special issue of *Transfusion Medicine and Hemotherapy* provides a detailed insight into state-of-the art stem cell mobilization, collection, and processing techniques. Regarding patients with multiple myeloma, Jantunen et al. comprehensively analyzed current mobilization strategies [1]. The impact of clinical parameters and induction regimens on peripheral blood stem cell (PBSC) mobilization in a large cohort of multiple myeloma patients has been evaluated by Sauer and colleagues [2]. In a more specific approach, Sauer et al. [3] assessed in a second study the effectiveness of autologous stem cell collection after daratumumab-VTD versus VCD. For the entity of mantle cell lymphoma, Turunen et al. examined the cellular composition and the clinical outcome after autologous transplantation [4].

In general, more than 80% of patients succeed in collecting an autologous PBSC graft. However, 10–20% mobilize insufficiently and are so-called "poor mobilizer" [5], but a harmonized definition has not been found yet. Strategies to overcome this problem include the application of plerixafor, either used preemptively or as a rescue strategy [6, 7].

However, comprehensive information on poor mobilizing patients regarding incidence, current treatments, and mobilization strategies is lacking. The German prospective, multicenter, open-label, non-interventional OPTIMOB study addressed this lack of knowledge by analyzing mobilization and collection parameters in a large cohort of adult, transplant-eligible, good and poor mobilizing patients with lymphoma or multiple myeloma. In this special issue, the results of this huge national study with 28 recruiting study centers are presented in two articles: Bittrich et al. [8] described the results in patients with multiple myeloma, whereas Kriegsmann et al. [9] showed the results of the cohort of lymphoma patients.

A state-of-the-art collection of PBSCs includes a system of quality control and benchmarking. Approaches to quantitatively assess the effectiveness of autologous leukapheresis sessions have been developed, and some allow not only to calculate the collection efficiency (CE2) but also to manage the duration of the apheresis session [10–12]. While 2.0×10^6 $CD34^+$ cells/kg body weight (bw) is uniformly accepted as minimum for one autologous transplant, the question of whether more cells for a second or third transplantation or a mere "backup" transplant should be provided is handled divergent. In the allogeneic setting, clinical aspects of both the donor and the recipient have to be considered, e.g., bw differences.

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Kayser et al. [13] analyzed a formula, alongside other parameters, to predict the outcome of hematopoietic stem cell collection in healthy allogeneic donors. As the number of requested CD34+ cells may vary between 4.0 and over 8.0 × 10^6 $CD34^+$ cells/kg bw (i.e., if the transplant will be further processed), this approach may help streamline the apheresis session and reduce the burden for the donor.

For decades, CD34 is the decisive marker for enumeration of PBSC grafts, but efforts have been made to develop further marker combinations for a more comprehensive assessment of the graft composition and hence quality (e.g., tri-lineage engraftment). As a step in this direction, Heuer et al. analyzed PBSC subpopulations by flow cytometry and correlated them with clinical outcome after autologous transplantation [14]. Taken together, this special issue of *Transfusion Medicine and Hemotherapy* gives an overview on some of the currently most relevant issues related to procuring PBSC grafts.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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Author Contributions

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